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CJ/T 188-2004

Technical Requirements of Utility Meters Data Transmission

户用计量仪表数据传输技术条件

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1 Scope

This standard specifies the basic principles, interfaces type and physical property, data link, data identification and data security and the requirements for data express format of the utility meters (hereinafter referred to as meters), including water meter, gas meter and heat meter.

This standard is applicable to automatic meter reading system of data exchange of one master one slave or one master multiple slave among the master station and slave station.

2 Normative References

The following normative documents contain provisions which, through reference in this standard, constitute provisions of this standard. For dated reference, subsequent amendments to, or revisions of, any of these publications do not apply. However, all parties coming to an agreement according to this standard are encouraged to study whether the latest editions of these documents are applicable. For undated references, the latest edition of the normative document referred to applies.

GB/T 778.1-1996 Meters for Cold Potable Water--Part 1:Specifications

GB 4706.1 Safety of Household and Similar Electrical Appliances; General Requirements

GB/T 6968-1997 Diaphragm Gas Meters

GB/T 17626.2 Electromagnetic Compatibility (EMC)-Testing and Measurement Techniques-Electrostatic Discharge Immunity Test

GB/T 17626.3 Electromagnetic Compatibility-Testing and Measurement Techniques-Radiated Radio-frequency Electromagnetic Field Immunity Test

GB/T 15277 Information Processing-Modes of Operation for a 64-bit Block Cipher Algorithm

GB/T 17901.1 Information Technology-Security Techniques-Key Management

CJ 128-2000 Heat Meter

CJ/T 133-2000 IC card Cold Potable Water

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3 Terms

3.1

Automatic meter reading system

It refers to the system of reading automatically the data of multiple utility meters through the transmission medium, AMR for short. This system is composed of slave station, physical signal channel and master station etc.

3.2

Master station

It refers to the equipment of selecting one, a set or the whole slave stations and exchanging the primary information with the slave stations, possibly hand-held device, computer or other data terminals.

3.3

Slave station

It refers to the equipment of being endowed with the sole recognized address in the whole network, accepting the information from the master station and exchanging the information with the master station. For the purpose of this standard, it refers to utility meters.

3.4

Bus

It refers to the physical connecting mode of the system connecting the master station and connecting multiple slave stations in parallel for communication.

3.5

Physical layer

It specifies the physical interfaces between the master station and slave station and the physical and electrical characteristics of the physical interfaces and is responsible for receiving and transmitting of the information on the physical media.

3.6

Data-link layer

It specifies the composition of information exchange frame between the master station and the slave station, flow control of information exchange and network protocol layer of error control and is built on the physical layer.

3.7

Hand-held device

It refers to the portable equipments capable of data exchange with digital terminal equipments or utility meters.

4 Basic Requirements for Data Transmission

4.1 General requirements

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4.1.1 AMR shall be possessed of the capacity for identification of different types of utility meters in the identical transmission medium and bi-directional communication.

4.1.2 The meters constituting the slave station of AMR shall be possessed of communication interfaces which shall meet the requirements of relevant provisions of this standard.

4.1.3 The meters constituting slave station of AMR shall be adopted built-in battery, the regular service time of which shall not be less than five years for heat meter and six years for water meter and gas meter.

4.1.4 Utility meters shall be provided with such output parameters as battery voltage state and valve state (only for the meters with valve control function).

4.1.5 See Annex A for the composition and requirements of AMR.

4.2 Water meter requirements

4.2.1 Water meter accuracy shall meet the requirements of Chapter 5 of GB/T 778.1-1996.

4.2.2 The output parameters of water meter shall include real time, balance date cumulant and current date cumulant.

4.2.3 The units indicated by the water meter shall meet the requirements of Article 4.2.1.2 of GB/T 778.1-1996.

4.3 Gas meter requirements

4.3.1 Gas meter accuracy shall meet the requirements of Chapter 6 of GB/T 6968-1997.

4.3.2 The output parameters of gas meter shall include real-time time, balance date cumulant and current date cumulant.

4.3.3 The units indicated by the gas meter shall meet the requirements of Chapter 5 of GB/T 6968-1997.

4.4 Heat meter requirements

4.4.1 Heat meter accuracy shall meet the requirements of Article 5.3.2 of CJ 128-2000.

4.4.2 Heat meter output parameters shall meet the requirements of Article 5.2.1 of CJ 128-2000.

4.4.3 The units indicated by heat meter shall meet the requirements of Article 5.2.2 of CJ 128-2000.

5 Physical Layer

5.1 Interfaces type

5.1.1 Communication interfaces of the meters shall meet those specified in Table 1.

5.1.2 Give priority to adopting the interfaces types in Table 1. When other interfaces are adopted, they shall meet the requirements of relevant standards.

Table 1 Communication Interfaces of the Meters

Mode number	Interfaces type	Requirement
1	Meter-BUS physical interface (M-BUS for short)	See Annex B
2	RS-485 interface	See Annex C
3	Wireless transmit-receive interfaces	See Annex D
4	Photovoltaic transmit-receive interfaces	See Annex E

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6 Data-link Layer

6.1 This Agreement adopts half-duplex communication modes with master-slave structure.

6.2 Byte format: each byte includes eight-bit binary codes, and one start bit, one even parity check bit (E) and one stop bit (1) are added during transmission, 11 bits in total. The transfer sequence of the byte is as shown in Figure 1. D0 is the lowest bit of the byte, D7 is the highest bit of the byte. High bit follows the low bits.

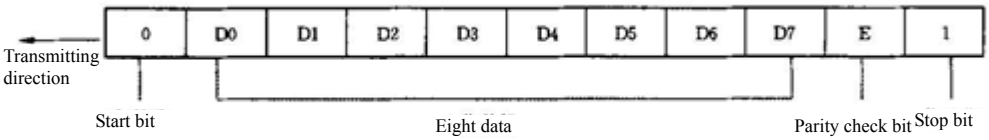

Figure 1 Transmitting Sequence of the Byte

6.3 Frame format shall meet those specified in Table 2.

Table 2 Frame Format

Name	Code
Frame start code	68H
Meter types	T
Address field	A0
	A1
	A2
	A3
	A4
	A5
	A6
Control code	C
Data length field	L
Data field	DATA
Checksum	CS
End code	16H

6.3.1 Meter types and their codes shall meet those specified in Table 3.

Table 3 Meter Types and Their Codes

Meter types	Code (T)	Meter
10 H~19 H: water meter	10H	Cold water meter
	11H	Water meter of domestic hot water
	12H	Water meter of direct potable water
	13H	Water meter of reclaimed water
20 H~29 H: heat meter	20H	Heat meter (counting the heat energy)
	21H	Heat meter (counting the cooling energy)

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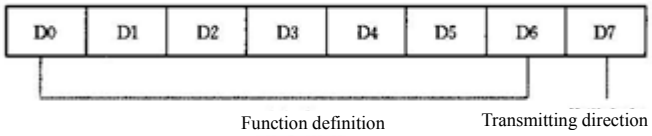
30 H~39 H: gas meter	30	Gas meter
40 H~49 H: other meters	40 H	Such as: electric meter

6.3.2 Address field (A0~A6) is composed of seven bytes, 2-bit BCD format each. The address length is 14-bit decimal number; the low address is followed by the high address, therein, A5 and A6 are manufacturer codes.

AAAAAAAAAAAAAH address is the broadcast address which is only applied to the point-to-point communication.

6.3.3 The format of control code (c) is as shown in Figure 2.



D7: 0——the control frame generated from master station;

1——the response frame generated from slave station.

D6: 0——the normal communication;

1——the abnormal communication.

D5~D0: 000000: reserved;

00000l: read data;

000100: write data;

001001: read key version number;

000011: read address (meter number);

010l0l: write address (meter number);

010110: write electromechanical synchronous numbers (setting basic number of meters);

1×××××: defined by the manufacturer .

6.3.4 The data length (L) is the byte number of data field and expressed with hexadecimal. L shall be less than or equal to 64 H during reading while L shall be less than or equal to 32 H during writing; if L is equal to zero, it means no data field.

6.3.5 The data field (DATA) includes data identification, serial number and data and its structure varies with the functions of control codes.

6.3.6 Checksum (CS) is a byte and all the bytes from the frame start code to the Checksum shall be accumulated with binary arithmetic, excluding the overflow value beyond FFH.

6.4 Transmission requirement

6.4.1 Leading byte: transmit 2~4 bytes FEH before frame information transmit.

6.4.2 Transmission sequence: all the multibyte data field shall transfer low byte followed by high byte.

6.4.3 Transmission response: command frame is given firstly from master station, the selected slave station makes response according to the requirements of command frame for each communication. See Figure 3 and Figure 4 for the time sequence of transmission response.

Binary digit transmission time: Tbit=1/baud rate(s);

Byte transmission time: Tbyte=11 Tbit;

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